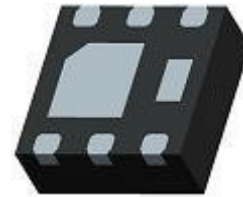


**WPM1481**
**Single P-Channel, -12V, -5.5A, Power MOSFET**
[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

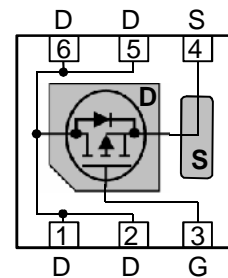
| V <sub>DS</sub> (V) | Typical R <sub>DS(on)</sub> ( ) | I <sub>D</sub> (A) |
|---------------------|---------------------------------|--------------------|
| -12                 | 0.022 @ V <sub>GS</sub> =-4.5V  | -5.5               |
|                     | 0.030 @ V <sub>GS</sub> =-2.5V  | -4.0               |
|                     | 0.045 @ V <sub>GS</sub> =-1.8V  | -2.5               |



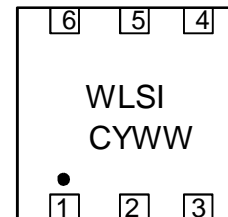
DFN2\*2-6L

**Descriptions**

The WPM1481 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM1481 is Pb-free.


**Pin configuration (Top view)**
**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package DFN2\*2-6L



WLSI = Company Code  
 C = Device Code  
 Y = Year  
 WW = Week

**Marking**
**Applications**

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

**Order information**

| Device        | Package   | Shipping       |
|---------------|-----------|----------------|
| WPM1481- 6/TR | DFN2*2-6L | 3000/Reel&Tape |

**Absolute Maximum ratings**

| Parameter                                |                        | Symbol    | 10 S     | Steady State | Unit             |
|--|------------------------|-----------|----------|--------------|------------------|
| Drain-Source Voltage                     |                        | $V_{DS}$  | -12      |              | V                |
| Gate-Source Voltage                      |                        | $V_{GS}$  | $\pm 12$ |              |                  |
| Continuous Drain Current <sup>a d</sup>  | $T_A=25^\circ\text{C}$ | $I_D$     | -5.1     | -4.3         | A                |
|  | $T_A=70^\circ\text{C}$ |           | -4.0     | -3.4         |                  |
| Maximum Power Dissipation <sup>a d</sup> | $T_A=25^\circ\text{C}$ | $P_D$     | 1.9      | 1.4          | W                |
|  | $T_A=70^\circ\text{C}$ |           | 1.2      | 0.9          |                  |
| Continuous Drain Current <sup>b d</sup>  | $T_A=25^\circ\text{C}$ | $I_D$     | -3.7     | -3.0         | A                |
|  | $T_A=70^\circ\text{C}$ |           | -3.0     | -2.4         |                  |
| Maximum Power Dissipation <sup>b d</sup> | $T_A=25^\circ\text{C}$ | $P_D$     | 1.0      | 0.6          | W                |
|  | $T_A=70^\circ\text{C}$ |           | 0.6      | 0.4          |                  |
| Pulsed Drain Current <sup>c</sup>        |                        | $I_{DM}$  | -24      |              | A                |
| Operating Junction Temperature           |                        | $T_J$     | -55~150  |              | $^\circ\text{C}$ |
| Lead Temperature                         |                        | $T_L$     | 260      |              | $^\circ\text{C}$ |
| Storage Temperature Range                |                        | $T_{stg}$ | -55 ~150 |              | $^\circ\text{C}$ |

**Thermal resistance ratings**

| Parameter   |              | Symbol   | Typical | Maximum | Unit               |
|---|--------------|----------|---------|---------|--------------------|
| Junction-to-Ambient Thermal Resistance <sup>a</sup> | t 10 s       | $R_{JA}$ | 49      | 64      | $^\circ\text{C/W}$ |
|   | Steady State |          | 66      | 88      |                    |
| Junction-to-Ambient Thermal Resistance <sup>b</sup> | t 10 s       | $R_{JA}$ | 84      | 118     |                    |
|   | Steady State |          | 125     | 180     |                    |
| Junction-to-Case Thermal Resistance                 |              | $R_{JC}$ | 32      | 42      |                    |

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR-4 board using minimum pad size, 1oz copper

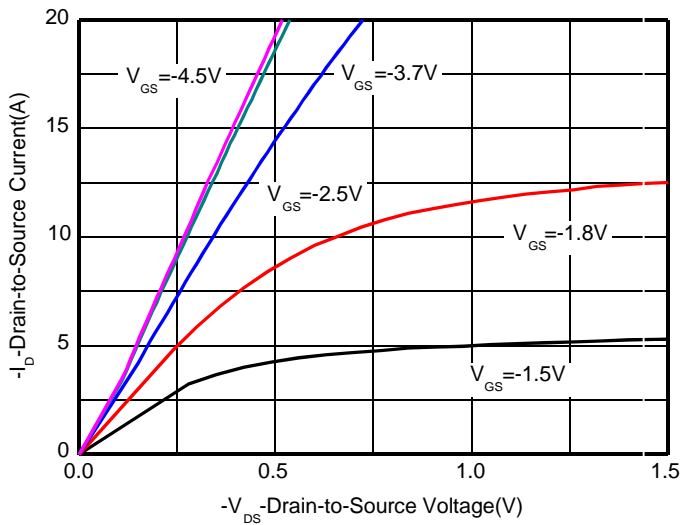
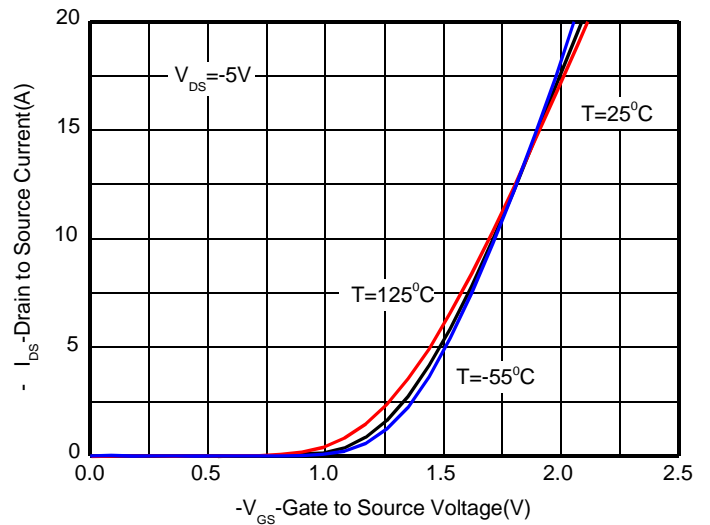
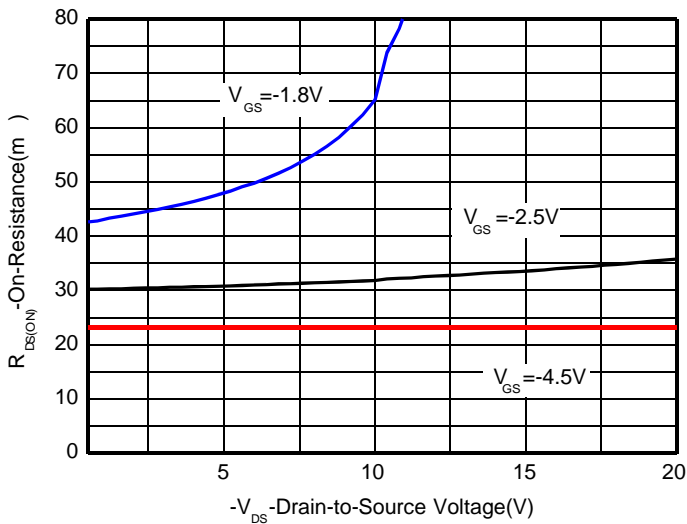
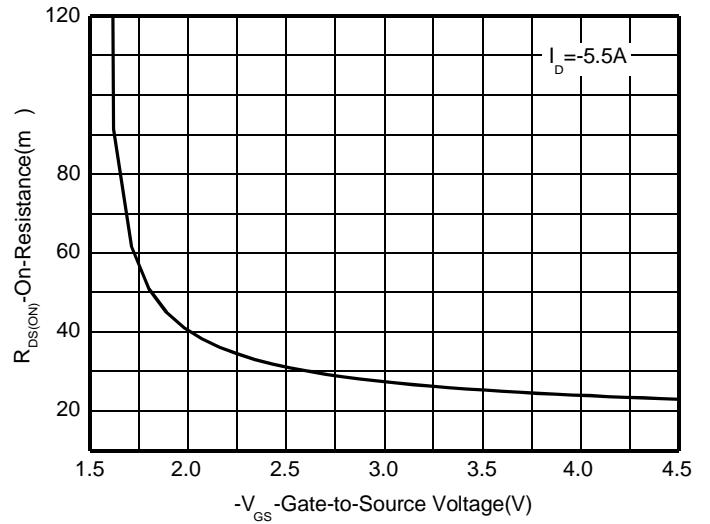
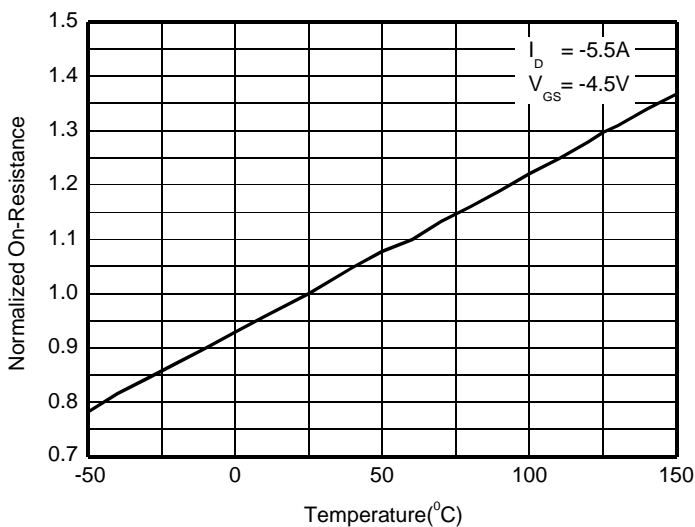
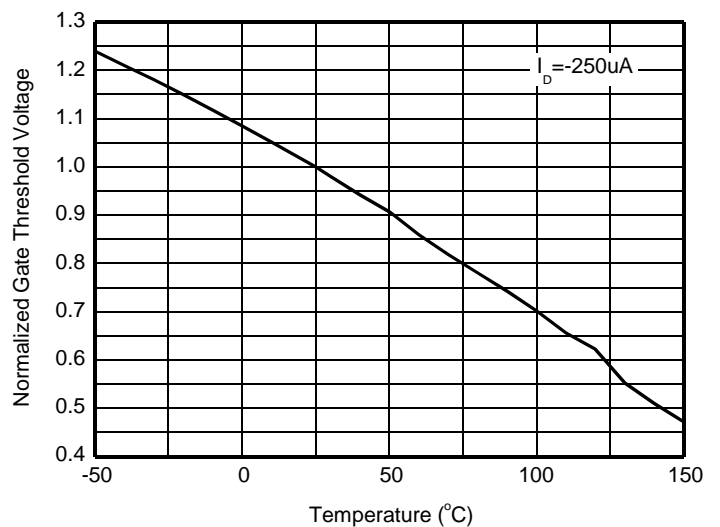
c Pulse width < 380 $\mu\text{s}$ , Single pulse

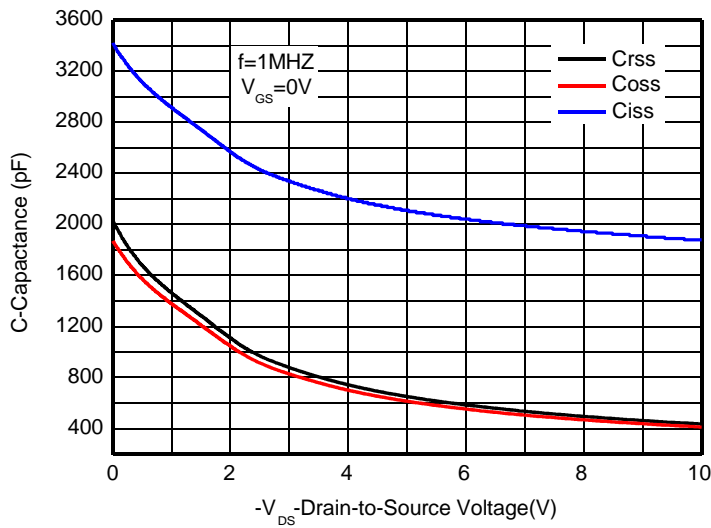
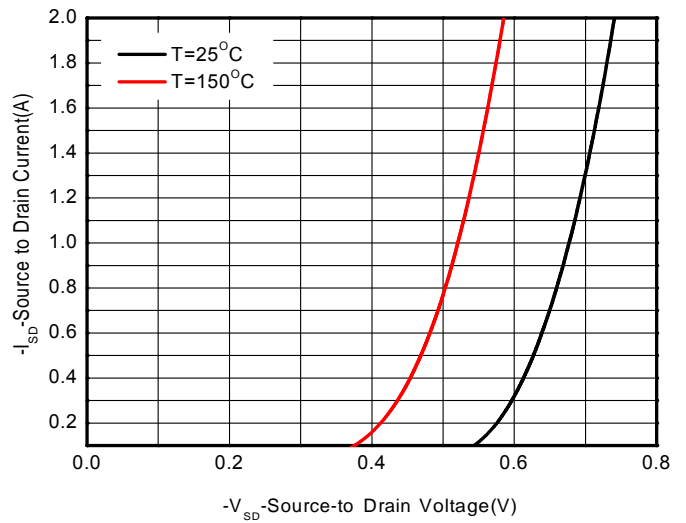
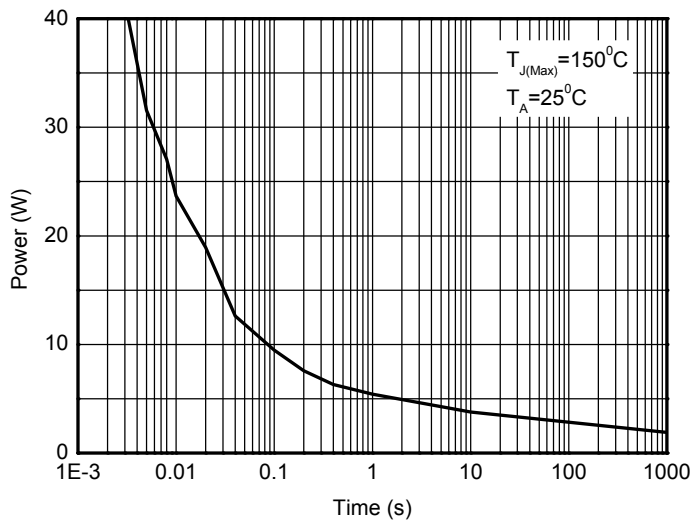
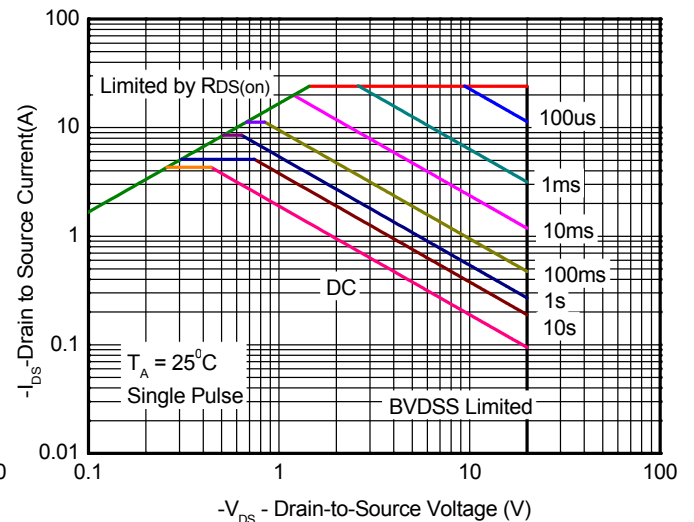
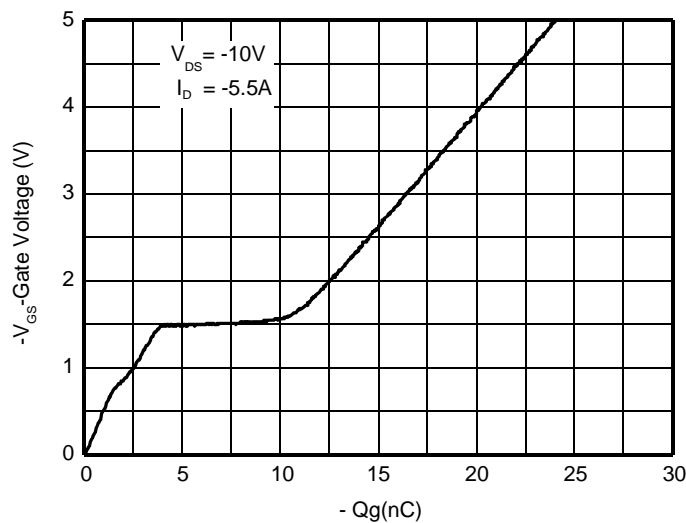
d Maximum junction temperature  $T_J=150^\circ\text{C}$ .

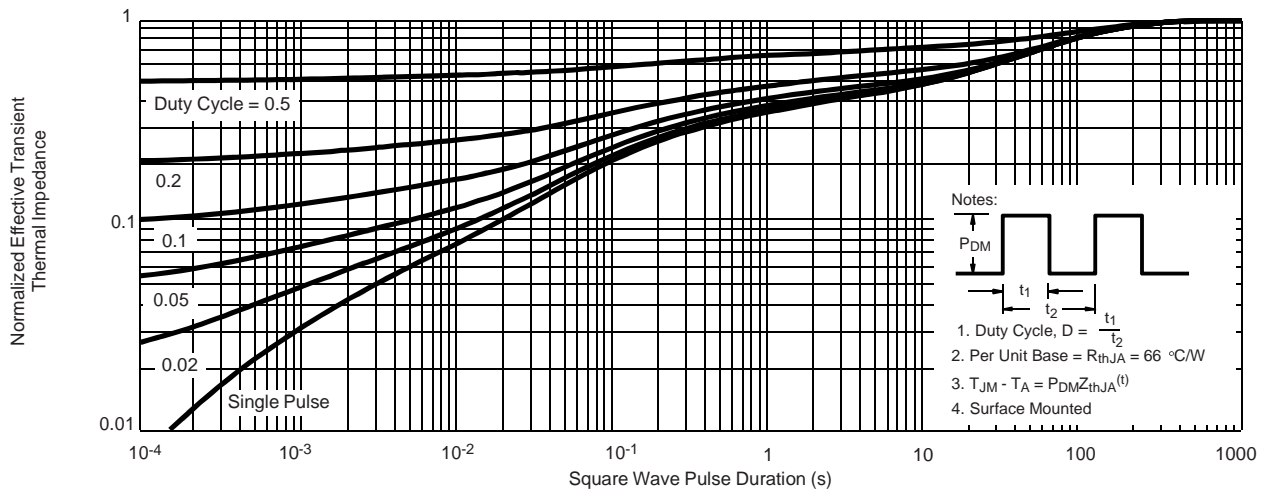
e Pulse test: Pulse width < 380 us duty cycle < 2%.

**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

| Parameter                                     | Symbol              | Test Conditions   | Min  | Typ   | Max  | Unit |
|---|---------------------|---|------|-------|------|------|
| <b>OFF CHARACTERISTICS</b>                    |                     |   |      |       |      |      |
| Drain-to-Source Breakdown Voltage             | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250uA  | -12  |       |      | V    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V  |      |       | -1   | uA   |
| Gate-to-source Leakage Current                | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±10V   |      |       | ±100 | nA   |
| <b>ON CHARACTERISTICS</b>                     |                     |   |      |       |      |      |
| Gate Threshold Voltage                        | V <sub>GS(TH)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250uA   | -0.4 |       | -0.9 | V    |
| Drain-to-source On-resistance <sup>b, e</sup> | R <sub>DS(on)</sub> | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5.5A   |      | 22    | 26   | m    |
|   |                     | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4.0A   |      | 30    | 38   |      |
|   |                     | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.5A   |      | 45    | 59   |      |
| Forward Transconductance <sup>e</sup>         | g <sub>FS</sub>     | V <sub>DS</sub> = -5.0V, I <sub>D</sub> = -5.5A   |      | 23    |      | S    |
| <b>CAPACITANCES, CHARGES</b>                  |                     |   |      |       |      |      |
| Input Capacitance                             | C <sub>ISS</sub>    | V <sub>GS</sub> = 0 V,<br>f = 1.0 MHz,<br>V <sub>DS</sub> = -10 V                                     |      | 1880  |      | pF   |
| Output Capacitance                            | C <sub>OSS</sub>    |   |      | 437   |      |      |
| Reverse Transfer Capacitance                  | C <sub>RSS</sub>    |   |      | 413   |      |      |
| Total Gate Charge                             | Q <sub>G(TOT)</sub> | V <sub>GS</sub> = -4.5 V,<br>V <sub>DS</sub> = -10 V,<br>I <sub>D</sub> = -5.5A                       |      | 44.5  |      | nC   |
| Threshold Gate Charge                         | Q <sub>G(TH)</sub>  |   |      | 3.5   |      |      |
| Gate-to-Source Charge                         | Q <sub>GS</sub>     |   |      | 1.7   |      |      |
| Gate-to-Drain Charge                          | Q <sub>GD</sub>     |   |      | 9.25  |      |      |
| <b>SWITCHING CHARACTERISTICS</b>              |                     |   |      |       |      |      |
| Turn-On Delay Time                            | td <sub>(ON)</sub>  | V <sub>GS</sub> = -4.5 V,<br>V <sub>DS</sub> = -6 V,<br>R <sub>L</sub> = 3 Ω,<br>R <sub>G</sub> = 6 Ω |      | 33.6  |      | ns   |
| Rise Time                                     | tr                  |   |      | 35.6  |      |      |
| Turn-Off Delay Time                           | td <sub>(OFF)</sub> |   |      | 50    |      |      |
| Fall Time                                     | tf                  |   |      | 63    |      |      |
| <b>BODY DIODE CHARACTERISTICS</b>             |                     |   |      |       |      |      |
| Forward Voltage                               | V <sub>SD</sub>     | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1.0A  |      | -0.76 | -1.5 | V    |

**Typical Characteristics (Ta=25°C, unless otherwise noted)**

**Output characteristics**

**Transfer characteristics**

**On-Resistance vs. Drain current**

**On-Resistance vs. Gate-to-Source voltage**

**On-Resistance vs. Junction temperature**

**Threshold voltage vs. Temperature**

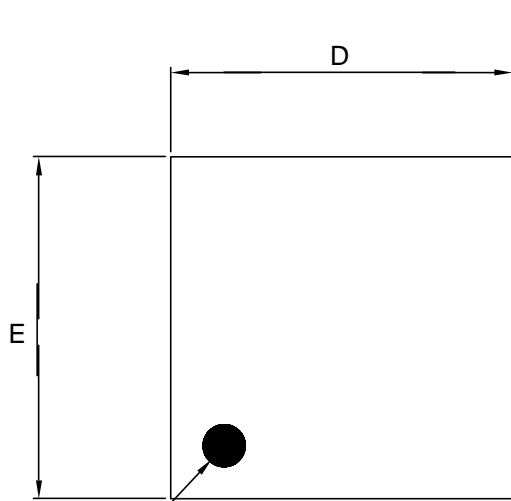
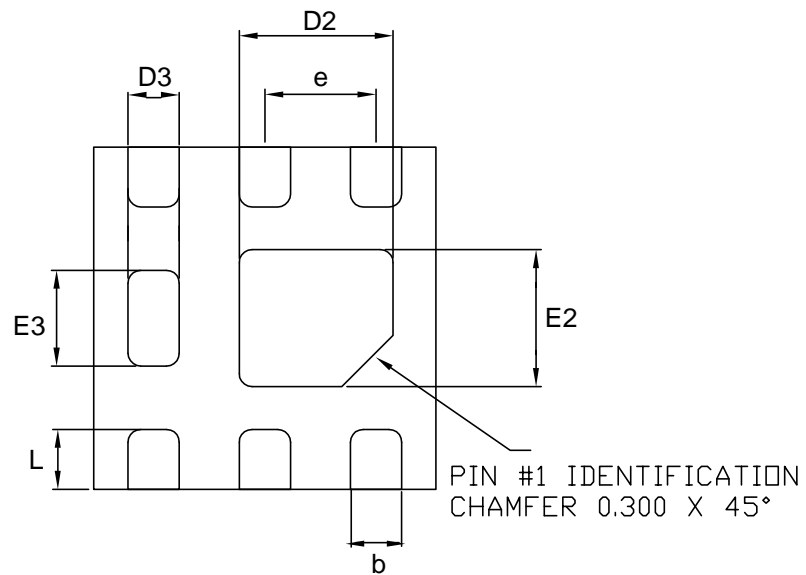
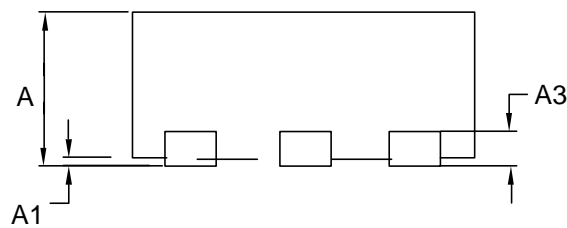

**Capacitance**

**Body diode forward voltage**

**Single pulse power**

**Safe operating power**

**Gate Charge Characteristics**



**Transient thermal response (Junction-to-Ambient)**

**Package outline dimensions**

DFN2\*2-6L


**Top view**

**Bottom view**

**Side View**

| Symbol | Dimensions in millimeter |      |      |
|--------|--------------------------|------|------|
|        | Min.                     | Typ. | Max. |
| A      | 0.70                     | 0.75 | 0.80 |
| A1     | 0.00                     | -    | 0.05 |
| A3     | 0.203 Ref.               |      |      |
| D      | 1.95                     | 2.00 | 2.05 |
| E      | 1.95                     | 2.00 | 2.05 |
| D2     | 0.85                     | 0.90 | 0.95 |
| E2     | 0.75                     | 0.80 | 0.85 |
| D3     | 0.25                     | 0.30 | 0.35 |
| E3     | 0.51                     | 0.56 | 0.61 |
| b      | 0.25                     | 0.30 | 0.35 |
| L      | 0.30                     | 0.35 | 0.40 |
| e      | 0.65 BSC.                |      |      |